



Warren Gretz, NREL/PIX00349

The wind industry pays more than \$31 million each year in salaries to its employees. Most jobs in the industry are related to operating and maintaining existing wind power plants.

Overview

Wind energy currently accounts for around 2% of the country's renewable-source generating capacity. In 1995, total wind generating capacity was approximately 1800 MW, most of it (1600 MW) installed in California.

The American Wind Energy Association (AWEA) reports that, in 1992, approximately 1260 people were directly employed in the more than 50 firms that make up California's wind industry. When indirect employment (about 4350 jobs) is added, the industry supported around 5600 full-time jobs in the state that year. Nearly all wind industry jobs are related to operating and maintaining existing wind power plants. According to AWEA, the

California wind industry pays more than \$31 million each year in salaries to its employees, and also contributes to local economies by paying roughly \$6.7 million in property taxes.

Like biomass, wind is a form of renewable energy that has special implications for farmers and rural communities — in this case, mainly because large wind farms have to be sited in relatively open countryside.

"Alone among the alternative energy technologies, wind power offers utilities pollution-free electricity that is nearly cost-competitive with today's conventional sources."

— Electric Power Research Institute, quoted on the CREST internet site

Success Stories

Renewable Power for the Midwest

Utility-scale generation of electricity from wind is particularly suited to the rural areas of the upper Midwest because of the region's tremendous wind resources and wide-open spaces.

In 1994, Northern States Power, Minnesota's largest investor-owned utility, committed to developing at least 425 MW of wind energy capacity by the year 2002. But commercial wind development on *any* scale was new to this region, and there was some uncertainty about what farmers and other residents would think about this.

So, in 1995, The Minnesota Project and the Clean Water Fund conducted a survey of area residents, primarily rural landowners, including a group of farmers from the Buffalo Ridge area of southwest Minnesota where development of a 25-MW wind power plant was already under way. The response was overwhelmingly positive.

"Wind development is almost unanimously supported by rural residents. They like the environmental benefits of wind energy, and they love the possibilities of injecting income and jobs into rural communities."

— *Harvesting the Wind*, a 1995 survey by The Minnesota Project and the Clean Water Fund

Of the 149 residents surveyed, 98% were in favor of developing wind resources for electricity, and 92% felt that renewable energy production could be a significant part of rural economic development — the reasons cited included income generation for landowners and communities (87% of respondents) and job creation (71%).

One of the respondents said that wind energy development would help “make rural communities and farms more self-sufficient economically.” Another said it would “allow money to stay at home in the local economy.” Still another said it would “raise the spirit of the community so people stay.”

Extra Income for Landowners

Although utility-scale wind projects appear to take up a great deal of land, the wind turbines themselves occupy only about 5% to 15% of the land area. The remaining land can be used for other purposes, such as farming, ranching, forestry, or for open space. Farmers can graze cattle or plant their crops right up to the base of the turbine towers, making wind power an ideal complement to agriculture.

“Not only do wind farms interfere little with agricultural operations, the leasing of land for wind turbines can be a major benefit for landowners.”

— *Powering the Midwest*, a 1993 report by the Union of Concerned Scientists

Although one-time payments for wind rights have been made, wind development companies typically offer lease arrangements under which the dollar amount of payments to landowners varies in proportion to the output of the turbines. In 1993, the Union of Concerned Scientists found that a Midwestern landowner hosting a wind farm under a variable-rate plan “could expect payments of around \$40 per acre per year *on top of* earnings from farming or grazing,” increasing

How It Works

The wind blows because of differences in atmospheric pressure created by geography and the temperature differences across the Earth’s surface; these temperature variations are caused by variations in the amount of sunshine falling on different areas — for this reason, wind is considered an indirect form of solar energy.

Energy is captured from the wind with wind turbines. The turbines have rotors that usually consist of two or three propeller-like blades mounted on a shaft. Wind turbines are mounted on tall towers, usually 100 feet or more above the ground where the wind is faster and less turbulent. When wind makes the blades turn, the shaft spins a generator to produce electricity.



Utility-scale wind plants coexist very well with ranching and farming. Farmers can graze cattle right up to the base of the turbine towers, as on this wind farm operated by Zond Systems at Altamont Pass, California.



Jerry Miller, Northern States Power Company/PIX01490

Farmers can earn extra income by leasing land for wind power plants, such as this one on Buffalo Ridge in southwest Minnesota.

his return on the land “anywhere from 30% to over 100%.”

The leasing of land for wind power plants pays well in other parts of the country, too. In California, for example, the City of Santa Clara leases 640 acres of land to Zond Systems, Inc., which owns and operates a wind farm at Altamont Pass, one of the largest developed wind sites in the United States. Zond sells the electricity to the local utility, Pacific Gas and Electric Company, and pays a royalty to the city — about \$152,000 in 1994 alone.

The existing lease contains a buyout option for the city, and Santa Clara may purchase the wind power plant from Zond once the city has learned enough to be comfortable managing the project.

According to William Reichmann, a senior electric utility engineer in Santa Clara’s Electric Department, “Our lease agreement has been lucrative both financially and in terms of information we gained from the site.” In fact, the city has recently signed a lease agreement with Zond for another site that shows promise for wind energy development.

Wind Projects Bring Money to Schools

The Louisville Gas and Electric Company operates a 35-MW wind farm in Culberson County, Texas, about 100 miles east of El Paso. The Lower Colorado River Authority buys the electricity generated at the wind site and distributes it to its customers. As a result of an innovative partnership with the Texas General Land Office, lease revenues from the wind project go directly into the Permanent School Fund, which helps to finance public schools and universities in Texas; in effect, school children are benefiting financially from the wind energy harnessed in west Texas.

Revenues are expected to total approximately \$3 million over the 25-year life of the project, or about \$120,000 annually.

“Public education in Texas will benefit by receiving millions of dollars in lease money from this project. ... I hope to see more wind power projects on state lands dedicated to the public schools.”

— Texas Land Commissioner Garry Mauro, speaking at the dedication of the Culberson County wind project, November 1995

At the other end of the scale, a small school district in northwest Iowa is making money from the sale of electricity generated by its very own wind turbine. A project that started out as a response to environmental concerns turned out to have a substantial financial benefit for the local community.

The project began in 1990, when a group of high school biology students challenged Harold Overmann, superintendent of the Spirit Lake Community School District, to find a renewable source of energy for the district. Instead of ignoring them, Overmann took them up on their challenge. District staff began a dialog with the local utility company, Iowa Electric, and investigated various renewable energy technologies before deciding on wind power. They then gathered data on wind speeds at the proposed site and worked hard to find a way to finance the project.

Three years later, at a cost of \$238,000, the district installed a wind turbine at the local elementary school. A grant from DOE paid for half of the cost and a loan from the Iowa Department of Natural Resources covered the rest. Since then, the turbine has been generating 324,000 kWh of electricity annually, worth about

\$25,000. The elementary school, however, uses only \$20,000 worth of electricity. Surplus power is sold to Iowa Electric. With the \$25,000 yearly savings, the loan will be completely paid back within a five-year period.

"I've never done anything that's been so popular in the community."

— Superintendent Harold Overmann, Spirit Lake School District, quoted on the Iowa Department of Natural Resources internet site

Once the district's loan is repaid, all of the electricity generated by the turbine will represent a direct saving to the district and, therefore, local taxpayers. The money saved can be directed into education. "We're using our non-instructional costs for instructional costs," said Overmann. "With the money we save we can fully equip a computer lab every year instead of paying for electricity."

Not only is the district helping itself, it is also saving the environment, just as it set out to do. The electricity generated by the wind turbine replaces 225 tons of coal and prevents 750,000 pounds of carbon dioxide emissions from polluting the air every year. "We're proud that we are helping to solve the pollution problem," said Overmann.



Lower Colorado River Authority/PIX02355

Lease revenues from this west Texas wind farm are used to finance public education in Texas. The local electric utility leases the land from the state, paying an average of \$120,000 annually.